Molecular Biology

DISCOVERY AND SEQUENTIAL ANALYSIS OF THE FIRST MISMATCH-REPAIR PROTEIN MSH2 IN *Tetrahymena thermophila*.

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Telomeric proteins are essential for maintaining the functionality of telomeres, which forms the end sections of chromosomes. In this project we tried to clone the first telomeric protein of *Tetrahymena thermophila* using PCR. Primers were designed on the basis of the sequences homology between known telomeric proteins of other ciliates. Rather than identifying the telomeric protein, the primers picked up a signal that codes for a DNA mismatch-repair protein called MSH2. This was an intriguing discovery as genomic instability, mismatch repair and telomeres are related topics. Therefore, we decided to clone MSH2. The 3' end of the gene was cloned using RT-PCR giving us a fragment of 732bp long. To clone the rest of the gene we used the TIGR genome database. The sizes of MSH2 range from 2600-3050bp in other organisms. Based on this assumption, 3500bp 5' to the 3' end was selected and it showed extensive sequence homology to human, yeast and bacterial MSH2s. For cloning the cDNA, we designed primers around the first twelve ATGs of the 3500bp from the database. Our investigation for potential functional domains led to the discovery of the two vital functional domains of MSH2. They are the ATP binding (p-loop) domain with the walker sequences DE & GKS and b) the helix-turn-helix DNA binding domain. Either domains shows extensive homology to their counterparts in other eurkaryotic MSH2s. Up till now, we have cloned 2450bp of the cDNA and are in the process of obtaining a full cDNA clone.

Key Words: Telomere Binding Proteins, MSH2, Mismatch-repair, *Tetrahymena thermophila*